Developing and Governing Entrepreneurial Ecosystems

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Scholars and policymakers are increasingly employing the concept of entrepreneurial ecosystems to better understand the continued regional concentration of high growth ventures. Ecosystems represent the economic, social, and policy environment surrounding the entrepreneurship process. Public and privately run entrepreneurship support programs form a critical part of entrepreneurial ecosystems by providing training and resources to entrepreneurs and new ventures they could not otherwise access. However, the role of support programs within ecosystems is poorly understood with little conceptual or empirical discussions about how support programs contribute to the development of successful entrepreneurial ecosystems. To address this gap this paper employs the concept of institutional thickness to identify the optimum structure of support programs within a region. Institutional thickness refers to elements of a region's political and economic structure that territorialize regional competitive advantage. The role of institutional thickness is explored through an investigation of entrepreneurship support programs aimed at technology entrepreneurs in Edinburgh, UK. 43 such programs are identified and a preliminary analysis was conducted regarding the services and resources they offer, the stage of the entrepreneurship at which they are aimed, and their relationship with other programs to deliver their support. While these programs display many aspects of institutional thickness there is a tension between the national focus of many programs funded by Scottish government sources and the need for a regionally specific focus to take advantage of regional path dependent capabilities.

1. Introduction

The concept of entrepreneurial ecosystems has enjoyed a recent growth in popularity within academic and policy circles. However, the idea that some regional social and economic environments are conducive to growth-oriented entrepreneurship is not new. There is a long legacy of work from disciplines such as geography (Malecki, 1997; Ritsilä 1999) sociology (Sorenson and Audia, 2000), and business research (Dubini, 1989; Bahrami and Evans, 1995) that emphasizes the relationships between entrepreneurs and their local economic and social contexts. The recent popularity of the topic has been driven by popular business and management books like Feld's (2012) *Startup Communities* as well as the emergence of metropolitan policy as a major driver in economic growth. But while entrepreneurial ecosystems have strong connections to existing frameworks such as

cluster theory and innovation systems, there has been limited work that examines the development of ecosystems and how they provide benefits to entrepreneurs.

The purpose of this paper is to critically investigate what we know about entrepreneurial ecosystems and the role of entrepreneurial support programs in their creation and operation. Ecosystems represent the regional economic, social, and cultural environment within a region that provides support and resources for growth-oriented entrepreneurs. These benefits come from a supportive local culture, networks of investors and advisors, and organizations that provide training and resources to entrepreneurs. These benefits do not develop in a vacuum; they are the result of a continuous process of development driven by the needs of multiple stakeholders. While the platonic ideal of entrepreneurial ecosystems, based on success stories like Silicon Valley or Boulder, Colorado, involves an entrepreneur-led transformation, more detailed histories of these regions demonstrate that the state, philanthropic organizations, and universities play a major role in their development (Saxenian, 1994; Lécuyer, 2006).

This paper syntheses the main conceptual foundations to contemporary ecosystem theory, in particular work on clusters and path dependency. Building on these concepts, the paper argues that institutional thickness (Amin and Thrift 1994; 1995) is a useful model to understand the structure of ecosystems. This framework is used to explore the governance structure of Entrepreneurship Support Organizations (ESOs) in Edinburgh, Scotland. While Edinburgh can be considered to have a very effective entrepreneurial ecosystem, it is home to the United Kingdom's only billion-dollar technology startups outside of London (Skyscanner and FanDuel), its ecosystem is dominated by publicly funded actors. This raises questions about

the overall effectiveness of these programs to provided target support and resources to new technological ventures in Edinburgh.

2. Literature review

Entrepreneurial ecosystems are the economic and social environment surrounding the entrepreneurship process: the "complexity and diversity of actors, roles, and environmental factors that interact to determine the entrepreneurial performance of a region or locality" (Spilling, 1996 p. 91). This environment is composed of the local market and labour force, the availability of investors and mentors, supportive public programs such as incubators or knowledge transfer centres, and a localized culture that supports the risk taking associated with high-growth entrepreneurship (Isenberg, 2010). Such environments help growth-oriented entrepreneurs in two ways. First, a supportive culture within the ecosystem normalizes entrepreneurial activities, increasing both the supply of potential entrepreneurs willing to take on the risks of starting a new venture and the number of people willing to accept the increased uncertainty of working at or investing in new ventures (Minguzzi and Passaro, 2000). Second, entrepreneurs draw resources such as knowledge spillovers, investment capital, and expert mentorship from their ecosystem (Nijkamp 2003; Audretsch et al., 2011).

One of the largest streams of ecosystems on entrepreneurial ecosystems has been identifying their most important attributes. This includes factors such as a supportive entrepreneurial culture and history of successful entrepreneurs (Spigel, Forthcoming), the presence of dense social networks of entrepreneurs, investors, and advisors (Baharmi and Evans, 1995; Zacharakis et al., 2003; Feldman, 2014), research intensive universities that produce both new technological innovations and new entrepreneurs (Harrison and Leitch, 2010), and the presence of open markets

with low regulatory barriers (World Economic Forum, 2013). These attributes increase the supply of entrepreneurs by encouraging risk-taking and innovative activities and improve the survival and growth prospects of new ventures through the resources and support they provide. In many ways an entrepreneurial ecosystem represents this virtuous cycle in which successful entrepreneurship creates the conditions and cultures that spur on further entrepreneurial development.

Current thinking about ecosystems can be critiqued on three levels. First, it lacks a strong theoretical foundation. Contemporary views of ecosystems are largely based on histories of successful entrepreneurial regions rather than rigorous research. While there have been multiple efforts to identify entrepreneurial ecosystems through large scale statistical analysis of levels of innovation and firm formation, we know less about how ecosystems actually deliver benefits to entrepreneurs (Acs et al., 2014). As a result it is difficult to understand the different ways ecosystems evolve over time and develop different institutional and social structures. A second concern is that much of the existing research on entrepreneurial ecosystems has focused on identifying elements of entrepreneurial ecosystems with little regard for the importance the individual elements play in the overall functionality of the ecosystem (Motoyama and Watkins, 2014). Finally, there has been little discussion about the governance structure of entrepreneurial ecosystems. Many profiles of entrepreneurial ecosystems tend to be hagiographies focusing on the leadership of individual entrepreneurs in building an ecosystem when the reality of the situation involves the active participation of many other actions from the public and educational sectors.

The conceptual antecedents of entrepreneurial ecosystems provide important insights that can be used to address these critiques. Current thinking on

entrepreneurial ecosystems draws on two key literatures: entrepreneurial environments and industrial clusters. While these areas differ in their particularities, they share the belief that there are attributes external to the entrepreneur or the firm but within a region that increase firms' competitive advantages against those outside the region.

2.1. Entrepreneurial environments and contexts

Researchers have long recognized the heterogeneous geography of entrepreneurial activity (e.g. Acs and Audretsch 1987; Kebble and Walker 1994). Some regions have enjoyed consistently high rates of entrepreneurial activity over the past fifty years while other regions lag behind. The economic and social environment surrounding the entrepreneurship process is a key factor in explaining this unevenness. Malecki, (1997), building on earlier work by management researchers such as Dubani (1989), Peer (1994) and Spilling (1996) popularized the concept of entrepreneurial environments to explore the continued concentration of highly innovative entrepreneurship in particular regions. These environments, built on a foundation of a strong entrepreneurial culture and the presence of universities and other knowledge creating organizations, "becomes self-reenforcing and sustaining," preserving the attractiveness of a place for entrepreneurs (Malecki, 1997 p. 68). This is in line with Moore's (1993) pioneering work on business ecosystems that stresses the dynamic and self-reproducing nature of these systems.

Such views have been incorporated into newer perspectives of the entrepreneurship process that emphasizes the social embeddedness of entrepreneurs in local and global networks they they draw on knowledge, resources, and emotional support. This is a break with an older tradition that focuses on the individual attributes and psychological profiles associated with entrepreneurial

activity (Steyaert and Katz 2004). Entrepreneurs draw the resources they require to start and grow the firm through these networks, with the densest and strongest connections often found within their local environment (Thorton and Flynn 2003; Schutjens and Volker 2010). The quality of the social capital and networks of a community will therefore have a significant impact on the ability of entrepreneurs to gather the information, resources, and support they require. While individual attributes such as educational background and prior experience with entrepreneurship still play an important role, the economic and cultural environment surrounding entrepreneurs will have a profound impaction the entrepreneurial journey (Julien, 2007).

Culture plays a crucial role in both the willingness of nascent entrepreneurs to take on the risk of starting a firm but also the willingness of other actors like investors, employees, and mentors to work with the entrepreneur. As shown by Saxenian (1994) and Aoyama (2009), regions with similar resources bases can have vastly different cultural orientations towards entrepreneurship, with some supporting the risk taking necessary for entrepreneurial development and others deprioritizing these activities. These cultures develop over time in response to a region's economic history and are resistant to short term policy interventions (Wyrwich, 2012). A supportive culture encourages both potential entrepreneurs to engage in risk taking activities as well as others to support the new venture by acting as advisors, investors, or employees. This helps overcome the traditional vulnerabilities of entrepreneurial ventures and increases their overall competitiveness (Ritsilä, 1999). In particular, a supportive entrepreneurial culture involves the normalization of activities such as intensive networking, cooperation, labour mobility, and spinoff

creation (Henry and Pinch, 2001). Such activities encourage the knowledge spillovers that enable entrepreneurial developments.

Work on entrepreneurial environments has two implications for our understanding of entrepreneurial ecosystems. First, the quality of the resources within the entrepreneurs local environment has a strong influence on their performance. Regions with strong, growing economies will have a host of opportunities, knowledge spillovers, and a deep labour pool of skilled workers that entrepreneurs draw on (Audrestch et al., 2011). Second, local cultural outlooks will have a major impact on not only the types of resources available within a community but also the ability for entrepreneurs to successfully access them. In this sense culture becomes a "powerful determinant of regional or national variation in the 'supply' of entrepreneurship" (Klyver and Foley, 2012 p. 2). Cultural attitudes towards entrepreneurship affect the propensity of those who hold these resources to associate with entrepreneurship (Spigel, 2013). Local cultures outlooks that create a high social status for entrepreneurship encourage other people to aid the process, for instance by investing in a high-risk, innovative startup or taking the time to mentor a new entrepreneur (Feldman, 2001). At the same time, local cultures can also work against entrepreneurial activity by stigmatizing the risks associated with innovative entrepreneurship (Staber, 2007).

2.2. Industrial clusters

Research on industrial clusters has heavily influenced thinking about entrepreneurial ecosystems. Unlike the entrepreneurial environment literature that highlights the overall importance of the contextual environment, cluster theory focuses on the specific ways firms gain an advantage by being located near other complimentary firms (Porter, 2000). Early proponents of cluster theories such as

Marshall (1920) argued that their advantages are driven by the co-location of firms in similar industries or supply chains who can share common infrastructures, skilled labour pools, and the development of specialized suppliers. More recent approaches, drawing on the work of Jacobs (1961) have stressed the importance knowledge spillovers due to the increased interaction between co-located firms (Maskell, 2001). The close proximity of firms allows them to observe and learn from each other and engage in cooperative activities that improve their ability to absorb and process new knowledge (Henry and Pinch, 2000).

Entrepreneurial ecosystems closely resemble what Marksuen (1996) termed Neo-Marshallian Industrial Districts, clusters built on the interactions between multiple small and medium sized firms that simultaneously cooperate and compete within the same industry. The competitive advantages provided to firms comes from the circulation of tacit knowledge between firms and normalization of particular firm routines such as cooperation and learning. However, the advantages of Neo-Marshallian clusters generally only develop when the region has specialized in a particular industry, such as biotechnology or high-end fashion (Glaser et al., 1992). As with Neo-Marshallian clusters, entrepreneurial ecosystems are marked by a type of relational organization and governance that lack a clear power hierarchy or formalized enforcement methods (Bell et al., 2009).

The growth of a cluster reproduces and enhances its advantages, in turn attracting more firms who can cooperate and compete in a stronger marketplace. The concentration of firms with specific needs creates a market for specialized suppliers, either for particular technological needs or support services such as patent lawyers or accountants (Kenney and Patton, 2005). The presence of these support firms create new advantages for firms in the cluster, creating a virtuous cycle in

which the cluster is strengthened over time. This creates a space for public support for these specialized needs such as targeted educational programs, research and development programs, or public financing of entrepreneurial ventures. The evolutionary paths of clusters create self-sustaining advantages which are key to the continued success of the cluster.

However, there are clear differences between clusters and entrepreneurial ecosystems. Clustered firms gain advantages from being co-located with firms in the same industry or supply chain because they can cooperate to serve larger clients, learn from each other's production techniques, and build up the untraded interdependencies that allow them to learn and innovative more effectively (Storper, 1997). This is not necessarily the case for entrepreneurial ecosystems. Entrepreneurs are more likely to share a core technology (such as computer coding) or a core challenges (growing a new venture) than a market or industry. Entrepreneurs within an ecosystem benefit from sharing knowledge and experience about the startup process itself rather than particular sectoral or market knowledge. Unlike traditional industrial clusters which build up a suite of supportive institutions and organizations related to the core industry of a region, entrepreneurial ecosystems are marked by the presence of multiple public and private organizations capable of supporting entrepreneurs across a variety of different industries (Pitelis, 2013). The advantages of an entrepreneurial ecosystem are related to entrepreneurial skills and resources rather than other industrial benefits found in more traditional clusters.

2.3 Path dependency

Neither clusters nor entrepreneurial ecosystems develop in a vacuum. Their eventual structure and the relationships between actors within them develop out of

the region's economic and social history (Carlsson, 2006). This process, known as path dependency, refers to the tendency of regional economies to follow existing 'paths' or trajectories laid down by its prior economic and social history (Boschma and Frenken, 2011). Contingent historical events can help spur the development of a new industry or cluster (Porter, 1998; Nelles et al., 2005). These events cannot be predicted before hand or be created by an external organization. The role of the state therefore is to create the conditions that can lead to such events, but with the knowledge that it is difficult to pre-ordain particular industries or firms that will be successful. Funding the development and commercialization of basic scientific research, helping to train entrepreneurs, or helping to improve the local markets and infrastructure help create an environment where seemingly random discoveries or entrepreneurial successes can contribute to the formation of a successful entrepreneurial ecosystem (Wolfe and Gertler, 2006; Mazzucato, 2013). However, policies designed to encourage entrepreneurship will not be effective in the absence of an underlying supportive cultural and institutional environment (Lerner, 2009).

The importance of durable cultural traditions and institutional routines to ecosystems makes them path dependent phenomenon. Ecosystems may build up organically over a long period of time (Bramwell et al., 2008) or they may develop quickly as the result of an external shock that rearranges existing economic structures (Feldman et al., 2005). Feldman's (2001; Feldman et al., 2004) work on the exogenous shock that helped create the Washington D.C bioscience cluster is of particular interest. The shock disrupted an existing cultural orientation within former federally employed scientists that saw entrepreneurial activities as "selling out and betraying scientific integrity," creating the conditions for scientific entrepreneurship

(Feldman, 2001 p. 861). This cultural shift helped create a new path in the region that contributed to the formation of a durable entrepreneurial ecosystem.

3. Governing entrepreneurial ecosystems

The main method regional and national governments have to support entrepreneurial development is to create initiatives to train entrepreneurs, provide financing, or supply other resources they require (Lundstrom and Stevenson, 2006). However, there has been little direct research on the role of governance public policy in entrepreneurial ecosystems. These programs do not constitute an entrepreneurial ecosystem by themselves. Their relationship with the rest of the elements of an entrepreneurial ecosystem is mediated through governance practices and entrepreneurs' beliefs about their effectiveness. The diffuse nature of power within the entrepreneurship process makes governance a critical factor. The state cannot dictate how entrepreneurs go about starting and running a business nor can it dictate people's attitudes toward risk and investment. Rather, support programs must work within existing social frameworks and networks of existing firms, entrepreneur-led initiatives, and institutions to order to deliver services and resources to entrepreneurs.

Based on his experience as a champion of Boulder's entrepreneurial ecosystem, Feld (2012 p. 25) makes the clearest argument for how an ecosystem should be structured, writing: "The most critical principal of a startup community is that entrepreneurs must lead it." Feld argues that most policy-driven attempts to build entrepreneurial ecosystem fail due to a lack of engagement with the on-the-ground needs of entrepreneurs. In his view, entrepreneurs must be in a position to articulate a vision for their entrepreneurial environment and take the leading role in

creating the various groups, networks, and programs that will deliver the support they desire.

However, there are substantial challenges in reaching Feld's vision of an entrepreneur-led ecosystem. Pitelis (2012) suggests that the issue of appropriability is a barrier to cultivating entrepreneur-led ecosystems. Entrepreneurs who create support organizations, mentor other entrepreneurs, and act as dealmakers help establish and maintain entrepreneurial ecosystems. But these activities require an inordinate amount of time and effort on the part of entrepreneurs who already have substantial responsibilities within their own firms. It is often difficult for entrepreneurs to perceive the benefits of starting or joining these types of organizations if they cannot see successful examples around them. It is possible that a supportive local culture can help overcome this barrier. Cultures that create a high social status for entrepreneurship and which normalize intensive networking help actors understand the value of participating in an entrepreneurial ecosystem. Recent work on dealmakers within entrepreneurial communities suggests that associating entrepreneurial support with civic pride is a powerful motivator for highly networked individuals to actively contribute to their ecosystem (Feldman and Zoller, 2012). As Feldman (2014 p. 4) argues: "a spirit of authenticity, engagement, and common purpose if the particular feature that differentiates successful [entrepreneurial] places."

This leaves a major role for the state and third sector groups in organizing programs to support entrepreneurship. While multiple authors have identified the key role that public and private programs play in entrepreneurial ecosystem (e.g. Isenberg, 2010; Spigel, Forthcoming), there has been relatively little work about how these programs support the development of a successful entrepreneurial ecosystem.

Case studies by the Kauffman Foundation are amongst the few sources on this topic (Motoyama et al. 2014; Moyoyama and Watkins, 2014). Moyoyama and Watkins (2014) identify two core missions of entrepreneurship support programs: broad support that connects entrepreneurs with mentors, advisors, and collaborations and functional support to provide training, and other resources like office space or financing for entrepreneurs. But while the authors suggest that linkages between these programs are critical to provide the appropriate support to firms at different stages of the venture creation and growth process, there is still a major research gap around how these programs should coordinate and integrate with more informal groups and social norms.

Work on clusters provides useful guidance on the role of the state in creating a fertile environment for fortuitous entrepreneurship but it gives fewer explicit policy models. Institutional thickness, a concept that developed out of early thinking on the role of clusters within a globalized economy, provides a more compelling model for the role of public, non-profit, and private organizations in helping to create an environment conducive to the formation of an entrepreneurial ecosystem. As originally described by Amin and Thirft (1994; 1995), institutional thickness refers to regions with a high number of economic development and support organizations that exhibit high levels of interaction and cooperation between them with well established goals, power relations, and a shared vision of a common regional goal. Institutional thickness is a governance structure of clusters that helps preserve their competitive advantage. This configuration of state and non-state institutions help ‘territorialize’ production systems, counterbalancing the tendency for firms to relocate to lower-cost regions. Networks of support programs, educational organizations, and more informal collaborative cultures provide firms with a competitive advantage that they

would lose if they moved their production or management functions away from the region.

Two elements of institutional thickness create the foundation for the emergence of entrepreneurial ecosystems. The first is a diverse array of support programs targeting different industries and types of entrepreneurs. Both public and private social enterprises can develop small yet focused programs to target specific areas of need, such as academic entrepreneurship, green technology, or getting existing firms ready for venture investment. Ideally these programs are either run by entrepreneurs themselves or developed based on intensive market research. Second, strong connections between these programs to ensure that their services cover the entirety of the entrepreneurship process, from initial idea to growth to the final exit. This allows programs to 'hand off' entrepreneurs as their needs change, providing more entryways for entrepreneurs to engage with support programs and ensuring continued support throughout the entrepreneurship process. Strong connections between programs also helped create the shared goals and sense of mission associated with institutional thickness.

5. Governance in Edinburgh's entrepreneurial ecosystem

5.1. Entrepreneurial support in Edinburgh, Scotland

Edinburgh, Scotland is one of the most successful areas for growth-oriented, technology-based entrepreneurship in the United Kingdom. It is the home of the UK's only technology startups valued at over one billion pounds outside of London. It ranks in the top ten of British cities in terms of the number of firms founded, patents per capita, and percentage of the population with higher education qualifications. The city boasts a major research university, the University of Edinburgh — which has Europe's leading computer science department — as well as two other

universities with strong engineering, business, and life science programs. Along with its traditional strengths in finance — Edinburgh is the second largest financial centre in the UK behind London — the city boasts strong concentrations of leading firms in software industries, creative services, and life sciences.

The devolution of economic development responsibilities to the Scottish Government has lead to a major role for public support for technology entrepreneurship in Edinburgh's economy (Keating, 2005; Brown et al., 2015). Scottish Enterprise, the main Scottish economic development organization, has distributed more than £250 million in aid and grants to firms in 2013-14 with a particular focus on growth-oriented ventures. This support is delivered through dozens of ESOs both within Scottish Enterprise or supported by it through grants. Some of these such support organizations provide general advice and guidance for entrepreneurs in any sector while others provide very targeted assistance for firms in priority sectors. Beyond Scottish Enterprise's programs there are many other ESOs operating in Edinburgh, ranging from large philanthropic organizations, university technology transfer and commercialization programs and informal networking groups operated by entrepreneurs.

The complex array of organizations providing support for entrepreneurs raises questions about their overall coordination and role in Edinburgh's overall entrepreneurial ecosystem. To better understand the relationship between the resources and support these organizations provide and the entrepreneurship process in Edinburgh an analysis of the various ESOs targeting technology entrepreneurs was conducted as part of a larger investigation. ESOs were identified through government publications, consultations with key informants, and monitoring Scottish entrepreneurship media outlets. The criteria for inclusion in the analysis

were (1) the program is targeted at technology entrepreneurs, broadly defined, (3) the program is specially targeting entrepreneurs in Edinburgh rather than being a general nation-wide program, and (3) the program has an actual support support staff and resources rather than being an initiative of another organization. 43 ESOs were identified using these criteria. This is necessarily an incomplete list as there is a constant churn as new programs are introduced and moribund ones are shut down.

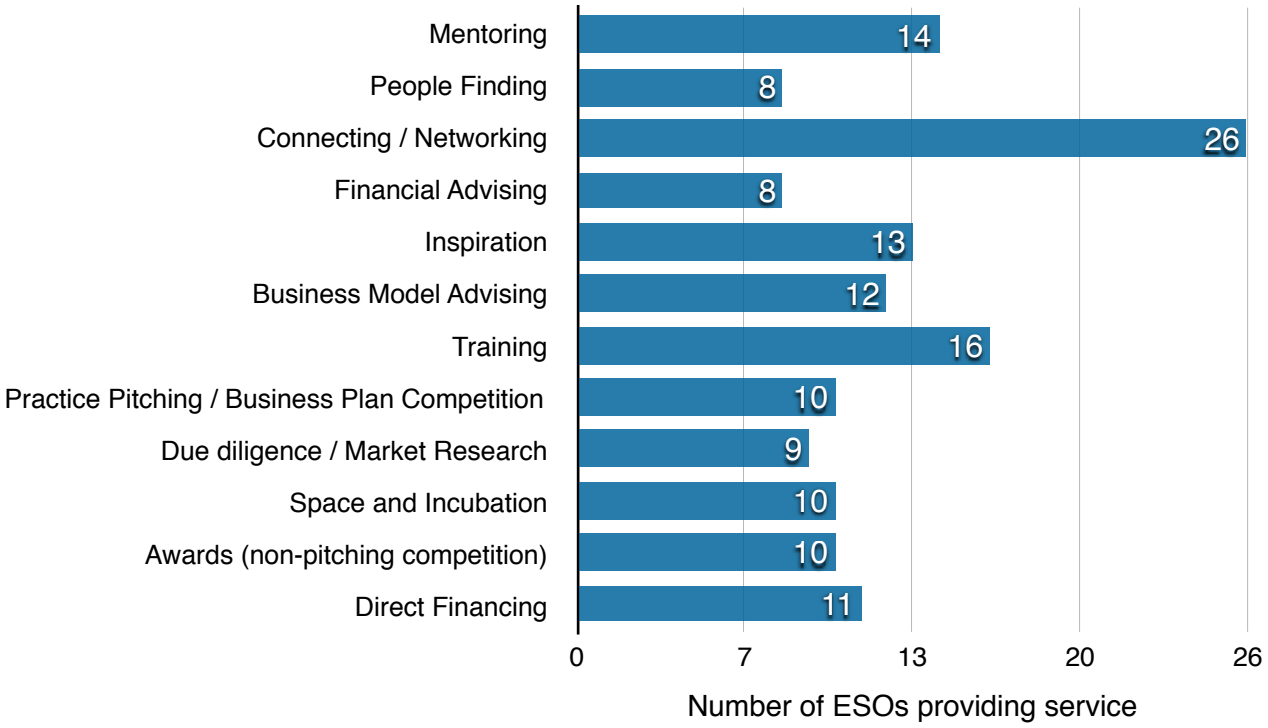
The websites and other public materials of these ESOs were analyzed in order to provide a basic overview of the types of services they provide and their relationships with other stakeholders in Edinburgh's entrepreneurial ecosystems. ESOs services were categorized according to the typology developed by Moyoyama and Watkins (2014). The authors identify two core functions of ESO: broad and functional. Broad support types focus on providing resources to aid the entrepreneur with their overall entrepreneurial journey, such as mentorship, networking, and financial advice. Functional support provides more targeted solutions to problems entrepreneurs face at specific stages of their firm development, such as helping refine their business model during the initial startup phase or subsidized office space in incubators and accelerators. Based on the services provides by the ESOs in the sample, one new type of support were added to the 'broad' category: inspiration, where the program's goal is to inspire new entrepreneurs by publicizing success stories. Three types of support were added to the functional category: training, non-competition awards, and direct financing. Training refers to programs which provide specific training services to entrepreneurs, for instance by educating them about the startup process or obtaining outside funding. Non-competition awards refer to awards given to entrepreneurs that do not involve a pitching competition but are

based on other criteria. Finally, direct financing programs provide either equity financing, loans, or grants to new ventures.

5.2 Attributes of ESO activity in Edinburgh

As shown in Figure 1, ESOs in Edinburgh provide more broad rather than functional support. Networking services were the most popular, with 26 out of the 43 ESOs (60%) providing them. This is in part due to the low cost of putting on networking events compared with other types of entrepreneurial support activities Training and mentoring were also popular support activities, with 37% and 32% of ESOs offering these services, respectfully. The least common activities were people finding, where the organization pro-actively connects the entrepreneur with advisors, investors, or other individuals who can help the venture grow, and financial advising.

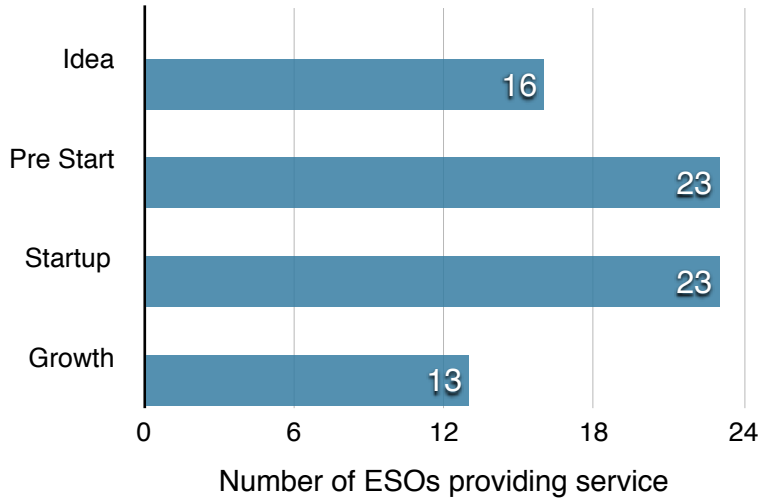
Figure 1: Types of Support provided by ESOs in Edinburgh



ESOs were further classified based on the stages of a venture's lifecycle they provide support for. Services can be supplied at the idea stage, where the

entrepreneur has an idea for a new venture but it needs refining, the pre-start phase where they are developing a business model and plan, the startup phase at which the entrepreneur has founded a new venture and is in the process of developing and selling their product, and finally the growth phase where the firm is expanding its market. ESOs differ in their focus, with some concentrating their resources only on one stage, such as the idea or growth phase, with others covering multiple phases of the entrepreneurship process. Figure 2 suggests a somewhat even distribution of ESOs with at least a partial focus on these stages. The lower number of programs for the growth phase of entrepreneurial ventures may be a concern given the growing realization about the importance of firms with high-growth potentials for economic development. However, firms at this stage need far more specialized support that is difficult for smaller or less focused ESOs to provide.

Figure 2: Stages of Support Provided by ESOs



As shown in Table 1, the majority of ESOs in Edinburgh are financed either directly or indirectly by public organizations like Scottish Enterprise, the Scottish Funding Council, the City of Edinburgh, or one of the city's universities. Twenty (46%) of the ESOs analyzed either are fully public bodies or are non-profits whose

funding comes from a public body. Five are public-private partnerships where a public organization funds a private enterprise to deliver entrepreneurial support services. Three ESOs are for-profit organizations who do not receive substantial government support. The remaining fifteen programs are best described as not for profit organizations who are supported by some combination of membership fees or donations. In total, 58% of the ESOs within Edinburgh's technology entrepreneurship ecosystem are publicly supported.

Table 1: Organizational Structure of ESOs in Edinburgh

Type of Organization	Number
Public	20
Private	3
Not for Profit	15
Public Private Partnership	5

A number of these public and public-private organizations are funded through major governmental programs, most frequently Scottish Enterprise, the Edinburgh City Council, or the University of Edinburgh. Scottish Enterprise is the dominant actor in the broader Scottish network of entrepreneurial support programs, directly or indirectly sponsoring dozens of different programs which range from broad business advice for entrepreneurs in all sectors to programs specifically targeted at high growth firms in designated sectors such as oil and gas, biotechnology, and software development. Of the 43 programs analyzed as part of this project, only nine (21%) did not receive a majority of their funding from a public source such as Scottish Enterprise. Most of these independent programs are informal networking groups. The only major actor in Edinburgh's entrepreneurial ecosystem not to receive substantial public financing is Codebase, a privately financed technology incubator facility established in 2013.

6. Institutional thickness in Edinburgh's entrepreneurial ecosystem

The number of ESOs operating in Edinburgh suggest that its entrepreneurial ecosystems contains the type of institutional thickness critical to preserving the region's competitive advantage ESOs in the region range from large, broad programs that provide generic training to every entrepreneur to much smaller and more focused programs designed to help provide mentorship, financing, and support to specific types of entrepreneurs in priority sectors. These ESOs make up an important part of Edinburgh's entrepreneurial ecosystem, providing resources and support to entrepreneurs that they would not otherwise necessarily have access to. The sheer number of programs designed to assist technology entrepreneurs suggests some degree of institutional thickness. There are programs to provide support and assistance across the entire entrepreneurship process, from the pre-idea stage until growth and eventual exit. These programs offer a wide variety of different services, including broad support that builds up the strength of the entire ecosystem and more functional support to provide targeted resources and capabilities to certain firms.

The role of Scottish Enterprise as a major funder of entrepreneurial initiatives in Scotland allows it to set the general direction and mission for many of the ESOs in Edinburgh. In this sense it can be seen as helping Edinburgh's entrepreneurship support community develop a common vision for an economic development path. However, the extent to which this common vision is based on the unique needs of Edinburgh's economy is questionable. The overall mission of Scottish Enterprise is focused on the economic development needs of the entire nation, which vary from the rural economy of the Highlands, the petroleum cluster in Aberdeen, and the design hub of Glasgow. While Scottish Enterprise is a nominally independent

agency, its priorities are set by the Scottish Government who often steer support towards sectors of the economy they deem important. The focus on Scotland-wide priorities makes it difficult for Scottish Enterprise to concentrate on the unique economic paths found in Edinburgh or other communities.

While Scottish Enterprise have programs to support industries concentrated in Edinburgh such as financial software, these are not their primary focus by any means. Many of the major recent entrepreneurial successes in Edinburgh in the software industry received comparatively little support from Scottish Enterprise affiliated programs because at the time the organization had a significant focus on the life sciences. Rather, independent programs or those run by the University of Edinburgh tend to focus more on specific attributes of Edinburgh's economy rather than more generalized types of entrepreneurial support.

While the structure of ESOs in Edinburgh meets the basic definition of institutional thickness, it is not clear if these programs actually territorialize entrepreneurial competitive advantage. Many programs, especially those aimed at the idea and startup phase, provide more generic resources and support that can be found in most areas throughout the United Kingdom. More local-specific programs are those that focus on connecting entrepreneurs with mentors. These program' draw on the very well developed business networks of Edinburgh to connect entrepreneurs with advisors with experience in their specific industry or market.

7. Conclusion

Support programs are only one part of an entrepreneurial ecosystem. While these programs act as a way to channel resources and guidance to entrepreneurs they do not by themselves constitute an entrepreneurial ecosystem. An ecosystem is based around the entrepreneurs, investors, advisors, and workers of a region along

with underlying cultural and social attributes that underlie the entrepreneurship process. Though ESOs are not the centre of ecosystems they can be seen as force multipliers which can build on and accentuate the existing attributes and networks of a region and provide a way to access resources that are not otherwise available.

As of yet there are few metrics or models to judge the effectiveness of support programs and organizations within an entrepreneurial ecosystem. Programs can be very useful to individual entrepreneurs while doing very little to build the overall ecosystem. Drawing on existing work on clusters and institutional economic geography, Amin and Thirft's Institutional Thickness theory may be an appropriate model for the structure and governance of support organizations within entrepreneurial ecosystems. Multiple programs can effectively provide a wide array of services and support to entrepreneurs across a variety of different sectors and stages of development. To function effectively these programs should exhibit some level of coordination based on a shared vision and centralized leader. Scottish Enterprise serves as a centralized leader who creates a shared vision through its support for many of the ESOs present in Edinburgh. However, the effectiveness of Scottish Enterprise as this kind of leader is questionable given that its focus extends far beyond Edinburgh and beyond support for growth-oriented technology ventures. Large-scale organizations are not in a position to develop within the constraints of existing regional paths and economic trajectories.

More research is necessary to judge if the current governance model of Edinburgh's ESO community is able to effectively serve local entrepreneurs and help sustain a successful entrepreneurial ecosystem. In particular, a better understanding of the actual communication and influence networks between the ESOs in Edinburgh would be a useful way of understanding the true role of Scottish Enterprise as

opposed to other more locally focused actors. Beyond this, more research is necessary to understand how entrepreneurs themselves work with ESOs to develop their skills, extend their networks, and obtain resources. Entrepreneurs' of support programs is their ultimate test of effectiveness and more information on how they utilize support programs will provide valuable insights into the overall place of ESOs within entrepreneurial ecosystems.

Acs, Zoltán J., Erkko Autio, and László Szerb. 2014. “National Systems of Entrepreneurship: Measurement Issues and Policy Implications.” Research Policy 43 (3): 476–94.
Amin, Ash, and Nigel Thrift. 1994. “Living in the Global.” In Globalization, Institutions, and Regional Development in Europe, edited by Ash Amin and Nigel Thrift, 1–22. Oxford: Oxford University Press.
———. 1995. “Globalisation, Institutional ‘thickness’ and the Local Economy.” In Managing Cities: The New Urban Context, edited by Patsy Healy, Stuart Cameron, Simin Davoudi, Stephen Graham, and Ali Madani-Pour, 91–108. Sussex: Wiley.
Aoyama, Yuki. 2009. “Entrepreneurship and Regional Culture: The Case of Hamamtsu and Kyoto, Japan.” Regional Studies 43 (3): 495–512.
Audretsch, David B., Oilver Falck, Maryann P. Feldman, and Stephan Heblich. 2011. “Local Entrepreneurship in Context.” Regional Studies 46 (3): 379–89.
Bahrami, Homa, and Stuart Evans. 1995. “Flexible Re-Cycling and High-Technology Entrepreneurship.” California Management Review 37 (3): 62–89.
Bell, Simon J., Paul Tracey, and Jan B. Heide. 2009. “The Organization of Regional Clusters.” Academy of Management Review 34 (4): 623–42.
Boschma, Ron, and Koen Frenken. 2011. “Technological Relatedness and Regional Branching.” In Beyond Territory: Dynamic Geographies of Knowledge Creation, Diffusion, and Innovation, edited by Harald Bathelt, Maryann P. Feldman, and Dieter F. Kogler, 64–81. New York: Routledge.
Bramwell, Allison, and David A. Wolfe. 2008. “Universities and Regional Economic Development: The Entrepreneurial University of Waterloo.” Research Policy 37 (8): 1175–87.
Brown, Ross, Geoff Gregson, and Colin Mason. 2015. “A Post-Mortem of Regional Innovation Policy Failure: Scotland’s Intermediate Technology Initiative (ITI).” Regional Studies, January, 1–13.
Carlsson, Bo. 2006. “The Role of Public Policy in Emerging Clusters.” In Cluster Genesis: Technology-Based Industrial Development, edited by Pontus Braunerhjelm and Maryann P. Feldman, 264–79. Oxford ; New York: Oxford University Press.
Dubini, Paola. 1989. “The Influence of Motivations and Environment on Business Start-Ups: Some Hints for Public Policies.” Journal of Business Venturing 4 (1): 11–26.
Feld, Brad. 2012. Startup Communities: Building an Entrepreneurial Ecosystem in Your City. Hoboken, NJ: Wiley.
Feldman, Maryann. 2001. “The Entrepreneurial Event Revisited: Firm Formation in a Regional Context.” Industrial and Corporate Change 10 (4): 861–91.
Feldman, Maryann, Johanna Francis, and Janet Bercovitz. 2005. “Creating a Cluster While Building a Firm: Entrepreneurs and the Formation of Industrial Clusters.” Regional Studies 39 (1): 129–41.
Feldman, Maryann P. 2014. “The Character of Innovative Places: Entrepreneurial Strategy, Economic Development, and Prosperity.” Small Business Economics 43 (1): 9–20.
Feldman, Maryann P., and Johanna L. Francis. 2004. “Homegrown Solutions: Fostering Cluster Formation.” Economic Development Quarterly 18 (2): 127–37.
Feldman, Maryann, and Ted D. Zoller. 2012. “Dealmakers in Place: Social Capital Connections in Regional Entrepreneurial Economies.” Regional Studies 46 (1): 23–37.
Glaser, Edward, Hedi Kallal, José Scheinkman, and Andrei Shleifer. 1992. “Growth in Cities.” Journal of Political Economy 100 (6): 1126–52.
Harrison, Richard T., and Claire Leitch. 2010. “Voodoo Institution or Entrepreneurial University? Spin-off Companies, the Entrepreneurial System and Regional Development in the UK.” Regional Studies 44 (9): 1241–62.
Henry, Nick, and Stephen Pinch. 2001. “Neo-Marshallian Nodes, Institutional Thickness, and Britain’s ‘Motor Sport Valley’: Thick of Thin?.” Environment and Planning A 33 (7): 1169–83.
Henry, N., and S. Pinch. 2000. “Spatialising Knowledge: Placing the Knowledge Community of Motor Sport Valley.” Geoforum 31 (2): 191–208.
Isenberg, Daniel J. 2010. “The Big Idea: How to Start an Entrepreneurial Revolution.” Harvard Business Review 88 (6): 40–50.

Jacobs, Jane. 1961. The Death and Life of Great American Cities. New York City: Random House.
Julien, Pierre-Andre. 2007. A Theory of Local Entrepreneurship in the Knowledge Economy. Cheltenham, UK: Edward Elgar.
Keating, Michael. 2005. “Policy Convergence and Divergence in Scotland under Devolution.” Regional Studies 39 (4): 453–63.
Kebble, David, and Sheila Walker. 1994. “New Firms, Small Firms and Dead Firms: Spatial Patterns and Determinants in the United Kingdom.” Regional Studies 28 (4): 411–27.
Kenney, Martin, and Donald Patton. 2005. “Entrepreneurial Geographies: Support Networks in Three High-Technology Industries.” Economic Geography 81 (2): 201–28.
Klyver, Kim, and Dennis Foley. 2012. “Networking and Culture in Entrepreneurship.” Entrepreneurship & Regional Development 24 (7-8): 561–88.
Lécuyer, Christophe. 2006. Making Silicon Valley: Innovation and the Growth of High Tech, 1930-1970. Inside Technology. Cambridge, Mass: MIT Press.
Lerner, Joshua. 2009. Boulevard of Broken Dreams Why Public Efforts to Boost Entrepreneurship and Venture Capital Have Failed, and What to Do about It. Princeton: Princeton University Press.
Lundstrom, Anders, and Lois A. Stevenson. 2006. Entrepreneurship Policy: Theory and Practice: Theory and Practice. Springer Science & Business Media.
Malecki, Edward J. 1997. “Entrepreneurs, Networks, and Economic Development: A Review of Recent Research.” In Advances in Entrepreneurship, Firm Emergence, and Growth, edited by J.A Katz, 3:57–118. Greenwich, CT: JAI Press.
Markusen, Ann. 1996. “Sticky Places in Slippery Space: A Typology of Industrial Districts.” Economic Geography 72 (3): 293–313.
Marshall, Alfred. 1920. Principals of Economics. London: Macmillian.
Maskell, Peter. 2001. “Towards a Knowledge−based Theory of the Geographical Cluster.” Industrial and Corporate Change 10 (4): 921–43. doi:10.1093/icc/10.4.921.
Mazzucato, Mariana. 2013. The Entrepreneurial State: Debunking Public vs. Private Sector Myths. London ; New York: Anthem Press.
Minguzzi, Antonio, and Renato Passaro. 2000. “The Network of Relationships between the Economic Environment and the Entrepreneurial Culture in Small Firms.” Journal of Business Venturing 16: 181–207.
Moore, James F. 1993. “Predators and Prey: A New Ecology of Competition.” Harvard Business Review May-June: 75–86.
Motoyama, Yassuyki, Jarad Konczal, Jordan Bell-Masterson, and Arnobio Morelix. 2014. Think Locally, Act Locally: Building a Robust Entrepreneirial Ecosystem. Kauffman Foundation.
Motoyama, Yassuyki, and Karren Watkins. 2014. Examining the Connections within the Startup Ecosystem: A Case Study of St. Louis. Kauffman Foundation Research Series on City, Metro, and Regional Entrepreneurship. Kansas City, Missouri: Kauffman Foundation.
Nelles, Jen, Allison Bramwell, and David A. Wolfe. 2005. “History, Culture and Path Dependency: Origins of the Waterloo ICT Cluster.” In Global Networks and Local Linkages: The Paradox of Development in an Open Economy, edited by David A. Wolfe and Matthew Lucas, 227–52. Montreal and Kingston: McGill-Queen’s University Press.
Nijkamp, Peter. 2003. “Entrepreneurship in a Modern Network Economy.” Regional Studies 37 (4): 395–405.
Peer, Hull Kristensen. 1994. “Spectator Communities and Entrepreneurial Districts.” Entrepreneurship & Regional Development 6 (2): 177–98.
Pitelis, Christos. 2012b. “Clusters, Entrepreneurial Ecosystem Co-Creation, and Appropriability: A Conceptual Framework.” Industrial and Corporate Change 21 (6): 1359–88.
Porter, Michael. 1998. “Clusters and the New Economics of Competition.” Harvard Business Review November-December: 77–90.
Porter, Michael E. 2000. “Location, Competition, and Economic Development: Local Clusters in a Global Economy.” Economic Development Quarterly 14 (1): 15–34.

Ritsilä, Jari J. 1999. “Regional Differences in Environments for Enterprises.” Entrepreneurship and Regional Development 11 (2): 187–202.
Saxenian, AnnaLee. 1994. Regional Advantage: Culture and Competition in Silicon Valley and Route 128. Cambridge, Mass: Harvard University Press.
Schutjens, Veronique, and Beate Völker. 2010. “Space and Social Capital: The Degree of Locality in Entrepreneurs’ Contacts and Its Consequences for Firm Success.” European Planning Studies 18 (6): 941–63.
Sorenson, Olav, and Pino G. Audia. 2000. “The Social Structure of Entrepreneurial Activity: Geographic Concentration of Footware Production in the United States, 1940-1989.” The American Journal of Sociology 106 (2): 424–61.
Spigel, Ben. Forthcoming. “The Relational Organization of Entrepreneurial Ecosystems.” Entrepreneurship Theory and Practice
———. 2013. “Bourdieuian Approaches to the Geography of Entrepreneurial Cultures.” Entrepreneurship & Regional Development 25 (9-10): 804–
Spilling, Olav R. 1996. “The Entrepreneurial System: On Entrepreneurship in the Context of a Mega-Event.” Journal of Business Research 36 (1): 91–103.
Staber, Udo. 2007. “A Matter of Distrust: Explaining the Persistence of Dysfunctional Beliefs in Regional Clusters.” Growth and Change 38 (3): 341–63.
Steyaert, Chris, and Jerome Katz. 2004. “Reclaiming the Space of Entrepreneurship in Society: Geographical, Discursive and Social Dimensions.” Entrepreneurship and Regional Development 16: 179–96.
Storper, Michael. 1997. The Regional World: Territorial Development in a Global Economy. New York: Guilford Press.
Thorton, Patricia H., and Katherine H. Flynn. 2003. “Entrepreneurship, Networks, and Geographies.” In Handbook of Entrepreneurship Research: An Interdisciplinary Survey and Introduction, edited by Zoltan Acs and David Audretsch, 401–33. Berlin: Springer.
Wolfe, David A., and Meric S. Gertler. 2004. “Clusters from the Inside and Out: Local Dynamics and Global Linkages.” Urban Studies 41 (5/6): 1071–93.
World Economic Forum. 2013. Entrepreneurial Ecosystems Around the Globe and Company Growth Dynamics. Industry Agenda. World Economic Forum.
Wyrwich, Michael. 2012. “Regional Entrepreneurial Heritage in a Socialist and a Postsocialist Economy.” Economic Geography 88 (4): 423–45.
Zacharakis, Andrew L., Dean A. Shepherd, and Joseph E. Coombs. 2003. “The Development of Venture-Capital-Backed Internet Companies: An Ecosystem Perspective.” Journal of Business Venturing 18 (2): 217–31.